SOME NEW AND KNOWN AUSTRALIAN PARASITIC NEMATODES.

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(Twelve Text-figures.)

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The nematodes mentioned in this paper were collected from various birds and frogs and from the tiger snake. In addition to descriptions of five new species, and a re-description of a known form, the paper contains an attempt to clarify the status of *Physaloptera antarctica* Linstow. Types are deposited in the South Australian Museum. We are grateful to those friends whose help in making collections is acknowledged below. Most of the remaining material was taken by the senior author. Our work was assisted by the Commonwealth Research Grant to the University of Adelaide. The parasites identified, listed under their hosts, are as follows:

Alectura lathami Grey (Eidsvold, Qd.). *Gongylonema alecturae*, n. sp.; *Ascaridia catheturina* (Johnston).

Centropus phasianus Lath. (West Burleigh, Qd.). *Vagrifilaria australis*, n. sp.; *Subulura differens* (Sonsino).

Eudyptula minor Forst. (S. Aust.; Tasm.; Vict.; W. Aust.). *Contracaecum eudyptulae*, n. sp.; (Broughton I., N.S.W.). *Anisakis* sp.

Notechis scutatus Peters (Tailem Bend, S. Aust.). *Physaloptera confusa*, n. sp.

Limnodynastes dorsalis dumerilii Peters (Tailem Bend and Adelaide, S. Aust.). *Physaloptera confusa*, n. sp. (encysted larvae) (Tailem Bend, S. Aust.). *Pharyngodon limnodynastes*, n. sp.

Hyla aurea Lesson (Sydney). *Physaloptera confusa*, n. sp. (encysted larvae).

Hyla peroni Bibron (Tailem Bend, S. Aust.). *Physaloptera confusa*, n. sp. (encysted larvae).

Physaloptera confusa, n. sp. Figs. 6–8.

From the stomach of many tiger snakes, *Notechis scutatus*, from Tailem Bend, South Australia, the reptiles having been collected at various times by Messrs. G. and F. Jaensch and L. Ellis. Males about 25–30 mm. long; females 35–38 mm. Lips each with two large papillae and a median amphid on outer surface, a median pointed tooth anteriorly, and on inner surface three bifid teeth (two lateral and a median); extending between and posterior to these bifid dorsal and ventral teeth, a definite ridge bearing very small and irregularly placed denticles; a patch of rather larger denticles at each side of angles of mouth; also several minute, irregularly scattered, denticles on inner surface of apex of lip. All these denticles are very small and perhaps seen only because the specimens were cleared and examined immediately after collection, when they were particularly transparent. In other worms of the same species which had been preserved longer the denticles were visible only in patches, in some cases the only ones seen being those at the dorsal and ventral sides of the lips. Muscular oesophagus 0·36 mm. in male, 0·4–0·5 mm. in female; total oesophagus 3 mm. in male, 4–5 mm. in female. Nerve ring around posterior part of muscular oesophagus; cervical papillae and excretory pore a little behind this level.

Male: Alae meeting posterior to body. One median sessile preanal papilla; four pairs pedunculated papillae; six pairs almost sessile, of which latter one pair preanal, two postanal and three on ventral surface of posterior half of tail. In older specimens the anterior pair of postanal papillae were not seen as they were folded into the anus. Ventral surface of bursa tuberculated between papillae, median part between anus and posterior papillae being very small. Spicules very unequal; longer 1·23–1·3 mm., fine,

cylindrical, tapering, ending in a spatulate part 80μ long with pointed tip and pronounced concavity; shorter 0·3 mm. long, tapering to a point.

Female: Tail rounded, 0·36 mm. long. Vulva 1:3–1:4 body length from head. Eggs thick-shelled, 30μ by 40μ.

With these worms were many immature specimens obviously of the same species. These range in size from 7 to 17 mm. length, 0·3 to 0·58 mm. in breadth. Oesophagus in the shortest 1:4·9 body length; in longest 1:6·5 body length. Nerve ring near base of muscular oesophagus; latter 0·28–0·34 mm. long. Excretory system very clear; lateral lines deviating ventrad at level of excretory pore and uniting ventrally into a wide transverse tube situated deep in hypodermis; from the transverse canal a narrow tube leads to the excretory pore which appears as a short transverse slit. No "gland" was observed. In the adult female the excretory system is similar, though not so clearly visible.

In the stomach of the snakes from which these nematodes were taken, were frogs belonging to two species, *Limnodynastes dorsalis dumerilii* and *Hyla peroni* (identified by H. Condon, S. Aust. Museum), some of them in various stages of digestion. In the mesentery of these frogs were cysts each containing a larval *Physaloptera* closely resembling the smallest of those taken from the snakes. These larvae range from 5–7·5 mm. in length, 0·4–0·52 mm. in width; oesophagus in shortest 1:3·9, in longest 1:5, of body length. Excretory system as described above. The cysts are disc-like, about 2 mm. in diameter, their walls containing a dark brown pigment. Similar cysts and larvae have been taken from the mesentery of *Limnodynastes dorsalis* from Adelaide; while from *Hyla aurea* from Sydney, less heavily pigmented cysts were collected, they contained Spiropterid larvae being at a much earlier stage of development and not definitely recognizable as *Physaloptera*, but we consider it probable that they belong to the same species.

Our adults differ from *P. antarctica* Linst., as described by Irwin-Smith (1922), in the relative sizes of the spicules, the shape of the longer spicule, and the size of the denticles on the lips. Ortlepp's description of *P. antarctica* (1922, p. 1067) gives a quite different account of the spicules which agree with those in our material. As Ortlepp did not mention the presence of denticles in *P. antarctica*, but did so when describing other species of the genus, it may be assumed that they were absent or insignificant in his specimens. The chief differences between the accounts of *P. antarctica* given by these two authors concern spicules and the denticles, neither of which was mentioned by Linstow. Thus neither account seems to be more applicable to Linstow's species than the other; but as Miss Irwin-Smith's work has priority over Ortlepp's, her description should stand as an emendment of Linstow's, and Ortlepp's species must be regarded as distinct. We suggest the name *P. confusa* for our species from the tiger snake and place Ortlepp's specimens from *Python spilotes* under it.

Physaloptera antarctica Linstow.

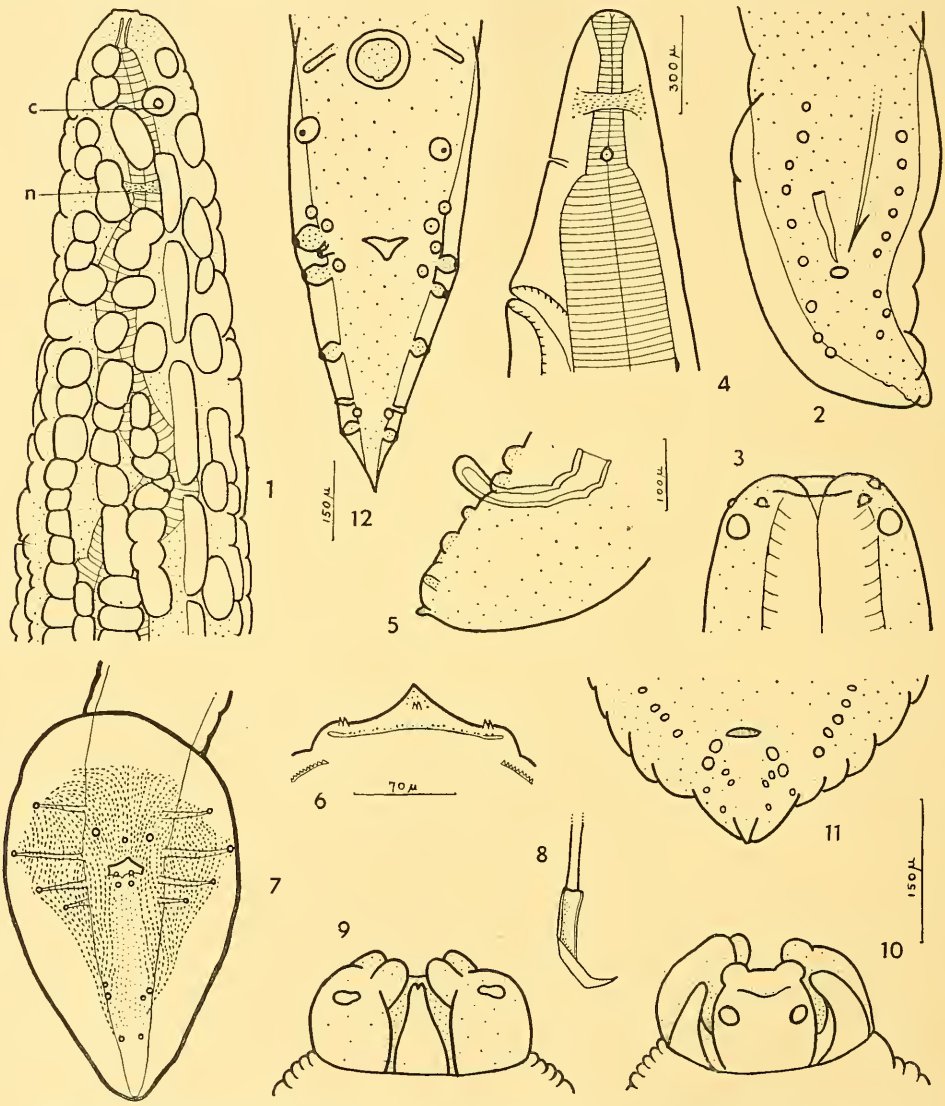
We have previously identified *P. antarctica* Linst. from *Varanus varius* (1941*a*) and *V. gouldi* (1941*b*) from Kangaroo Island, S. Aust., in both cases the specimens agreeing with the description given by Miss Irwin-Smith (1922).

Linstow's specimens were collected in South Australia from the death adder, *Acanthophis antarctica*, and a blue-tongued lizard, *Cyclodus* (i.e., *Tiliqua*) *occipitalis*. *Acanthophis* probably should have been selected as the type host because of the specific name of the nematode, but as Irwin-Smith was the first reviewer and gave a more extended description based on *Tiliqua*, she thereby definitely fixed the species. She added *typica* and *lata* as varietal differentiations. Our *P. confusa* is distinct from both of these forms. Miss Irwin-Smith's specimens came from *Tiliqua scincoides* from New South Wales, but she mentioned (1922, p. 242) that the lizard, *Egernia cunninghami*, was possibly the host for *lata*. Ortlepp's material was from *Python spilotes* and *Varanus varius* from Australia, apparently from European Zoological Gardens (probably London). We have examined the alimentary tracts of six specimens of *Acanthophis antarctica* from South Australia without having found any parasites in them. The discrepancy between the two more recent accounts is referred to under *P. confusa*, and it seems

likely that two species are concerned, viz., *P. confusa* from snakes and *P. antarctica* (as described by Irwin-Smith) from lizards.

GONGYLONEMA ALECTURAE, n. sp. Figs. 1–2.

From the brush turkey, *Alectura lathami*, collected by the late Dr. T. L. Bancroft at Eidsvold, Queensland. Males about 35 mm. long; females 90–100 mm. Bosses on anterior end extending for 0·64 mm. in male and 1 mm. in female from anterior end of worm; continuous lateral flange not present but a series of short flanges along lateral



Figs. 1-2.—*Gongylonema alecturae*, n. sp. 1. Anterior end of female. 2. Male tail.

Figs. 3-5.—*Vagrifilaria australis*, n. sp. 3. Head, ventral view. 4. Anterior end of female. 5. Male tail.

Figs. 6-8.—*Physaloptera confusa*, n. sp. 6. Inside of lip. 7. Bursa. 8. Tip of longer spicule.

Figs. 9-11.—*Contracaecum eudyptulae*, n. sp. 9 and 10. Ventral and dorsal views of head. 11. Male tail.

Fig. 12.—*Ascaridia cathetura* (Johnston). Male tail.

Figs. 1, 2, 3, 9, 10 and 11 to same scale; figs. 4 and 7 to same scale; figs. 6 and 8 to same scale. *c*, cervical papilla; *n*, nerve ring.

lines in embossed area. Cervical papillae 0·12 mm. from head in both sexes, each situated on circular boss. Excretory pore 0·56 mm. from head in female. Vestibule 0·04 mm. long in both sexes. Oesophagus 5 mm. in male, 9 mm. in female; anterior part much narrower, 0·48 mm. in male, 0·6 mm. in female. Nerve ring 0·18 mm. in male, 2 mm. in female, from head.

Male: Alae asymmetrical, that on one side being wider. Spicules very unequal; one shorter (on same side as wider ala) 80μ long, stout, tapering; longer 18·3 mm. long, very fine, ending in barbed tip. Six pairs preanal and three pairs postanal papillae, those on same side as wider ala and shorter spicule spaced further apart; on this side probably two very shallow additional papillae near posterior end of alae.

Female: Posterior end of body somewhat swollen; anus 0·16 mm. from tip. Ovaries at opposite end of body; uteri uniting a little posterior to midbody; vulva 18 mm. from posterior end in worm, 86 mm. long (i.e., at about one-fifth body length). Eggs thick-shelled, 55μ by 35μ, containing embryo. The species differs from others described from birds chiefly in the position of the vulva.

Vagrifilaria australis, n. sp. Figs. 3–5.

From the coelome of the swamp pheasant or coucal, *Centropus phasianus*, from West Burleigh, southern Queensland, collected by Dr. O. W. Tiegs. Length of female 40–45 mm.; male 25 mm. Head rounded with two large and three small papillae on each side, the small ones more anteriorly situated than the large. Oesophagus of two regions; anterior portion 0·46 mm. long in female, 0·4 mm. in male; posterior part wider, 6·44 mm. long in female, 6·6 mm. in male. Nerve ring just posterior to middle of anterior part of oesophagus; excretory pore and rounded cervical papillae just anterior to junction of two regions of oesophagus.

Male: Tail rounded, 0·17 mm. long, without alae. Two pairs preanal and three pairs postanal papillae, and a small terminal papilla. Spicules equal, massive, spatulate, blunt-tipped; 0·25 mm. long.

Female: Anus 0·14 mm. from rounded posterior end. Vulva 0·9 mm. from head in worm 40 mm. long. Eggs 55μ by 30μ, containing coiled larva.

The species resembles members of the genus *Vagrifilaria* in the shape of the head, the presence of papillae on the head, the form of the spicules and the absence of caudal alae in the male. It differs, however, in the relative sizes of the two regions of the oesophagus and in the lengths of the male and female tail. It is very close to *Coronofilaria*, but differs in the absence of a cuticular collar around the head, and of small papillae all over the body, as well as in the characters of the oesophagus.

Linstow in 1887 recorded *Filaria* sp. from a related host, *Centropus ateralbus* from the Bismarck Archipelago. The length of the females agrees with ours, but in the absence of males, Linstow did not give any further description.

Ascaridia catheturina (Johnston). Fig. 12.

Several specimens of this species were taken from a brush turkey, *Alectura lathami*, by the late Dr. T. L. Bancroft, at Eidsvold, Queensland. The present material agrees with the original description in all particulars except the number of papillae on the male tail. These are arranged as follows: a pair at the level of the sucker, a pair midway between the sucker and the cloaca, a group of six at each side of the cloaca, a pair half-way down the tail, and a group of three on each side nearer the tip of the tail. The median pre- and post-cloacal papillae originally described were not observed. A re-examination of a cotype male of the species showed that the arrangement of the papillae agreed with the above description.

Subulura differens (Sonsino).

From a coucal, *Centropus phasianus*, from West Burleigh, Queensland (coll. Dr. O. W. Tiegs). The normal hosts are galliform birds.

Contracaecum eudyptulae, n. sp. Figs. 9–11.

The species was obtained from the digestive tract of fairy penguins, *Eudyptula minor*, from various places on the Australian coast: Encounter Bay (coll. Dr. Cleland);

Goolwa (coll. E. Cotton); Fremantle (coll. Dr. Cleland); Derwent River, Tasmania; Portland, Vict.; Western Port, Vict. (coll. Dr. Nicholls); Brighton, S. Aust.; Wollongong, N.S.W.; and from Sellicks Beach, S. Aust. (S. Aust. Museum). Male 12–25 mm., female 13–41 mm. long. Head much wider than long and narrower than succeeding body. Lips without lateral cuticular flanges; with antero-lateral rounded projections. Interlabia bifid at tips, nearly as long as lips. Collar long. Oesophagus 1:6–1:10 body length (latter ratio in older specimens); oesophageal appendix 1:3–1:4 and intestinal caecum 1:3–1:5 of oesophageal length. Nerve ring 0·4–0·6 mm. from head end, and small cervical papillae a little behind this level.

Male: Spicules very long, 1:1·7–1:2·8 of body length, alate, alae ending just before tips. Twelve or more pairs preanal papillae; six pairs postanal.

Female: Vulva 1:2·6–1:3·3 of body length from head. Tail conical, pointed, about 0·25–0·32 mm. long. Eggs more or less spherical, with pitted shells, 25–30μ diameter.

Our species is very close to *C. spiculigerum* but is distinguishable by its longer spicules and by the shape of the lips. In *C. spiculigerum* the antero-lateral projections of the lips are rather rectangular, and when the lip is viewed from the side, do not project much beyond the level of the rest of the lip, but in the species from *Eudyptula* they are rounded and, when viewed laterally, project anteriorly beyond the level of the lip.

Anisakis sp., larvae.

Two small collections from *Eudyptula minor* from Broughton Island, N.S.W. (collected by the late Prof. L. Harrison). Length about 9–12 mm. In specimen 10·7 mm. long, 0·3 mm. wide, anterior part of oesophagus 1·52 mm. long; ventriculus 0·36 mm.; nerve ring 0·24 mm. from head; and tail 72μ long, ending in short spine 10μ long. Lips are not fully developed but one can recognize that there are three and that interlabia are absent. In some worms the lips are less developed and a larval tooth is present. The specimens perhaps represent Anisakine larvae liberated from fish and may not be normal parasites of penguins.

Pharyngodon limnodynastes, n. sp.

From *Limnodynastes dorsalis dumerilii*, taken from a tiger snake, *Notechis scutatus*, at Tailem Bend, S. Aust. Females only present; length 4·9–5·2 mm., breadth 0·4–0·48 mm. Three lips very shallow; three triangular teeth; vestibule practically absent. Oesophagus 0·56 mm. long, terminal bulb spherical, 0·12 mm. diameter; nerve ring 90μ from head; excretory pore not seen. Narrow lateral alae extending from head to anus; latter 0·7 mm. from posterior end of body; tail ending in spike 0·65 mm. long, without spines. Vulva with salient lips, 0·8–1 mm. from head. Eggs thin-shelled, with embryo, 31μ by 110μ.

The species differs from other *Pharyngodon* known from frogs in the more anterior position of the vulva, the more elongate eggs, and the shape of the teeth.

Literature.

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